

Archives of
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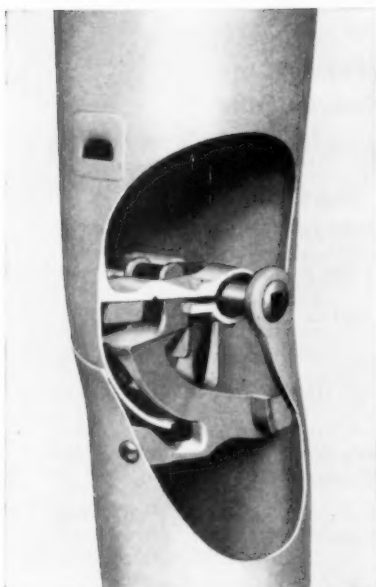
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Scientific Program

MONDAY, August 20, 10:00 a.m.

The Opening Ceremony in the Festival Hall of the University of Copenhagen, Frue Plads, Copenhagen K.

The lighting of the Ceremonial Lamp by the President of the International Federation of Physical Medicine.

Installation of the President of the Congress by the President of the International Federation of Physical Medicine.

Presidential Address: Dr. Sv. Clemmesen.

Speech of Welcome by the Chairman of Dansk Fysiurgisk Selskab, Dr. Ole Sylvest.

Lecture by Dr. Sv. Clemmesen.

MONDAY, August 20, 2:30 p.m.

Subject: **The Heat Regulation and Peripheral and Central Circulation as Basic Problems within Physical Medicine.**

Chairman: Professor Ejnar Jarlov, M.D., Denmark.

TUESDAY, August 21, 10:00 a.m.

Subject: **The Striated Muscle. Clinical and Physiological Problems in Relation to Physical Medicine.**

Chairman: Professor K. M. Walthard, M.D., Switzerland.

WEDNESDAY, August 22, 10:00 a.m.

Subject: **Rehabilitation.**

Chairman: Frank H. Krusen, M.D., U.S.A.

THURSDAY, August 23, 10:00 a.m.

Subject: **Clinical Communications.**

Chairman: L. T. Wedlick, M.D., Australia.

FRIDAY, August 24, 10:30 a.m.

General meeting of the International Federation of Physical Medicine. Report from the Honorary Secretary, Ph. Bauwens, M.D.

Closing ceremony by the President, Sv. Clemmesen, M.D.

Detailed information regarding this meeting may be had from the Office of The Secretary General:
B. STRANDBERG, M.D., KOBENHAVNS AMTS SYGEHUS, HELLERUP, DENMARK.

Rehabilitation: An International Problem

Howard A. Rusk, M.D.

New York

One of the most significant developments in medicine in the 34 years that have elapsed since the American Congress of Physical Medicine and Rehabilitation held its first meeting, is the tremendous growth of professional and public interest in rehabilitation and services to the handicapped. Looking back over this third of a century we can see tremendous technical advances in the use of the techniques of physical medicine and rehabilitation in diagnosis, treatment, and rehabilitation. Paralleling these technical advances has been a new emergence and emphasis on the dignity of man — recognition that it is not eyes and ears and extremities, but the spirit within that makes a man.

Undoubtedly, much of this expanding interest in both the technical and social aspects of physical medicine and rehabilitation resulted both directly and indirectly from our wartime experiences in the early 40's and the rapid utilization of this wartime experience through the Baruch Committee on Physical Medicine and the establishment of the American Board of Physical Medicine and Rehabilitation.

These developments, important as they have been, were really symptoms of far greater underlying causative factors. Two thousand years ago the average length of life was but 25 years; at the turn of the century, it was 49; by 1950 it had reached 67; and we are now on the threshold of the legendary three-score and ten. As a result of this lengthening of the life span, today in America more than 28,000,000 of our fellow citizens are suffering from chronic disability. Staggering as this is, we can expect it to increase in the future; for, as our population continues to grow older, the incidence of chronic disability and its resultant physical disability will continue to increase correspondingly. It is to our specialty of physical medicine and reha-

bilitation that medicine as a whole and the public look for leadership in developing the dynamic programs that will make it possible for the increasing numbers of persons with physical disabilities "to live and to work with what they have left."

This tremendous surge of public and professional interest in rehabilitation has not been limited to the United States. Great Britain, Canada, and the Northern European nations, faced as we are in this nation with a striking increase in chronic disability resulting from the extension of the life span, have long recognized the medical, social, and economic values of rehabilitation.

This interest now, however, is being seen in Latin America, the Near East, Southern Europe, and Asia, in those parts of the world commonly termed "underdeveloped." In some of these nations, rehabilitation services are provided by voluntary groups that are national affiliates of the International Society for the Welfare of Cripples. In others, the national or local governments have built the facilities and operate the programs. Regardless of who bears the operational responsibility, however, these programs have many features in common. Major among these is competent, experienced, trained medical leadership and direction.

Currently in Sao Paulo, Brazil, final plans are being made for the development, with assistance from the United Nations, of a major physical medicine and rehabilitation center at the University of Sao Paulo. A key figure in that development will be a young Brazilian doctor trained in physical medicine and rehabilitation in the United States.

Across the world in Bombay, India, a similar center is being started. Again, the

Chairman, Department of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center; President, International Society for the Welfare of Cripples.

Read at the Thirty-third Annual Session of the American Congress of Physical Medicine and Rehabilitation, Detroit, September 1, 1955.

key medical personnel will be physicians trained in physical medicine and rehabilitation in the United States.

When a poliomyelitis epidemic occurred last year in Costa Rica and experienced medical direction was urgently needed, the World Health Organization flew a young Chilean specialist in physical medicine and rehabilitation to Costa Rica to take charge. Again, a physician trained in the United States.

These developments over the world—the new centers and programs in Lebanon, Korea, Indonesia, Colombia, the Philippines, and Egypt—did not just happen. Behind them, particularly in the so-called underdeveloped areas of the world a new concept of the dignity of man is beginning to emerge, the value of the worth of the individual, that is being symbolized and expressed in the development of rehabilitation and services for the handicapped. Nor is it coincidental that in many, many instances these nations have looked to the United States and the specialty of physical medicine and rehabilitation to provide them with the leadership and knowledge in establishing such programs.

Just as our own favorable geographical, political, economic, cultural, and social circumstances have placed the United States in a position of world leadership and responsibility in so many other fields of endeavor, we bear a special responsibility globally in the development of rehabilitation services to the handicapped. But in accepting this responsibility, we are serving more than high idealistic, moral and humanitarian ends.

Peace is never a product of military force alone. Nearly ten years of the cold war have taught us that the political health of our own nation and of the world depends on the physical and mental health of our people. Today through the World Health Organization, the United Nations, our own International Cooperation Administration, and various international voluntary organizations, we have tangible and specific methods through health for building strong allies and true friends.

Experience has long shown that rehabilitation services for the disabled is a

purchasable commodity. Today the world now has the technical knowledge and skills to bring improved rehabilitation services to the disabled no matter where they live. Results can be anticipated almost in direct ratio to the efforts and funds expended.

Aside from the political and economic significance of improving the health of the people of the world, rehabilitation can also provide the understanding between peoples and nations that is the essential foundation of any political effort toward peace. This has been brought forcibly home to me during the past few years when I have had increased opportunity for personal travel and have seen directly the results that can be achieved in international understanding through rehabilitation and services to the handicapped.

Last September at The Hague, for example, at the Sixth World Congress of the International Society for the Welfare of Cripples, there were 800 delegates from 30 nations. Physicians, nurses, government officials, employers, physical therapists, occupational therapists, and interested citizens had one common interest—how services for the disabled in their own nations and globally could be improved and extended. They came mostly at their own expense because of their desire to learn and to share their experiences and knowledge with others.

Two unmistakable facts emerged from the meeting. The first—and very encouraging—is that rehabilitation services for the disabled are increasing rapidly throughout the world. The second—and very discouraging—is that the number of persons needing such services is increasing more rapidly.

A part of the increasing incidence of physical disability found in the developed parts of the world results from the lengthening of the life span through medical advances, better public health, and improved living standards. Persons who a few decades ago would have died from acute communicable diseases now live and in their later years acquire such crippling afflictions as arthritis, multiple sclerosis, and Parkinson's disease, or they suffer strokes. Similarly each year, medi-

cal advances are made that prevent death but leave survivors with severe disabilities. Each represents a precious human life saved, but it raises the question of whether the society that can save a life can also, through rehabilitation, give that life dignity, purpose, and meaning. It was to this responsibility that Sir William

Osler referred when he said, first, "The great republic of medicine knows and has known no national boundaries" and, second, "There is no more potent antidote to the corroding influence of mammon than the presence in the community of a body of men devoted to science."

Productive Living For Those With Heart Disease: The Role of Physical Medicine and Rehabilitation

Louis B. Newman, M.E., M.D.

Reuben R. Wasserman, M.D.

and

Craig Borden, M.D.

Chicago

Productive living for those with heart disease, in the majority of instances, is not in the realm of fantasy. Through a complete physical medicine and rehabilitation program, closely integrated with the best medical care and utilizing the ancillary hospital services, such as social service and vocational counseling, as well as other federal, state, and community agencies, many cardiac patients can return to gainful employment. A medically controlled activity program during and after hospitalization that we have evolved to fill the specific physical, mental, psychological, social and vocational needs of the patient will be described. Definite criteria to be used by the physician and the therapists for guidance of the rehabilitation activities must be established. It is unwise and unrealistic to believe that all cardiac patients can return to their former state of health and work capacity. Many will be limited as to the type and amount of work possible. Selective job placement and periodic evaluations are essential.

Incidence of Heart Disease

Man's ability and frequently his willingness to perform work is affected adversely by the tremendous incidence of heart disease, which limits to some de-

gree one person in every 15 or 16. Each year 176 million man-work-days of productivity are lost to industry as a result of heart disease and at a cost of several billion dollars. Heart disease has incapacitated about 25 per cent of those individuals who are beneficiaries of the Federal Aid Program of Assistance for those who are permanently and totally disabled.

During World War II over 300,000 young men were rejected by the Selective Service Boards because of heart conditions. Rheumatic fever with associated cardiac involvement immobilized over 40,000 men in the Armed Forces during World War II at a cost to the government of approximately \$16,000 per in-

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dividual or a total of \$640 million. During this same period 4 million man-days were lost in the Navy alone because of the same disease. Compensation and pension payments in 1950 to veterans with disabilities from heart disease amounted to \$168,250,000.

Enos, Holmes, and Beyer¹ studied the results of 300 autopsies performed on United States battle casualties in Korea, most of whom were killed in action or suffered accidental death. In those individuals whose average age was 22.1 years, there was no clinical evidence of heart disease, yet 77.3 per cent of the hearts examined revealed evidence of coronary arteriosclerosis.

According to statistics furnished by the Chicago Board of Health in 1953, deaths resulting from cardiovascular disease amounted to 55 per cent of the total number of deaths from all causes during this same period. It is appalling to note that of all deaths in the United States during the entire year of 1950, 51.4 per cent were caused by cardiovascular disease.

These statistics readily show the staggering effect of heart disease on the nation's economy; however, what is more important are the depressing and frustrating effects on the individual and his family.

Rehabilitation Objectives

Can individuals with heart disease be gainfully employed and lead productive lives? It is unwise and unrealistic for those in rehabilitation to attempt to return all patients with heart disease to their prior state of health and ability to work. Many of these persons will be limited not only as to the type of work they can resume but also in the amount of work possible. As a matter of fact, a certain percentage of people with heart disease will only be able to perform self care and daily living activities, while still others may be even limited in these performance abilities.

The individual with heart disease must be aided in developing an optimistic and serene outlook on life, even though this may be extremely difficult for the so-called hypertensive or high-strung indi-

vidual. For the patient to proceed in life with less fear, anxiety, and haste, and with a greater measure of cheerfulness and optimism will usually result in a fuller measure of success in his rehabilitation.

Newman and Baker² have listed the objectives of total rehabilitation for the cardiac patient. Some of these are:

1. To indoctrinate and orient the patient not only regarding his disease but also the rehabilitation program that is being planned for him. This procedure will definitely aid in his emotional, psychological, and social adjustment, thereby relieving the boredom so frequently associated with the slow passage of time during illness.

2. To stimulate motivation on the part of the sick person, thereby securing greater cooperation and program participation leading to the maximum performance of self-care and daily living activities and an increased work capacity. The greatest use must be made of the hospitalization period.

3. To institute as early as medically feasible rehabilitation procedures for a sufficient period of time to secure maximum beneficial results and to aid in gradually increasing and measuring capacity for work performance.

4. To prevent general body deconditioning with its resulting ill effects, both physical and mental, thereby allaying "nervousness" and "anxiety tension."

5. To aid in the prevention of peripheral circulatory stasis and its frequently associated complications.

6. To aid the patient in understanding his physical and mental limitations both during and after hospitalization.

7. To closely coordinate and integrate the physical medicine and rehabilitation program with all of the other medical and ancillary services. The total medical picture always must govern the type, rate, and amount of rehabilitation.

8. To establish a realistic vocational goal leading to gainful employment for those individuals who will be unable to return to their former job. Only through proper hospital planning and selective job placement can success for the cardiac patient be achieved.

Physical Medicine and Rehabilitation Activities

In any rehabilitation program it is necessary to understand that there are to be no routines or fixed rules. The program, which is a therapeutic balance between activity and rest, must at all times be individualized to meet the specific needs of the patient.

In the hospital or rehabilitation center, through the rehabilitation program, one should attempt to simulate the physical demands of a work situation. On the other hand, it may be extremely difficult and frequently impossible to duplicate exactly the psychological and emotional stresses that may be produced by uncooperative or disagreeable co-workers or supervisors, piece-work schedules, meeting "dead lines," unusual environmental noises, and other factors.

The activities are under the close direction and guidance of the physiatrist, the type and amount being graded according to the over-all medical status of the patient. The therapists must be thoroughly trained and have an awareness and understanding of any untoward reactions occurring during treatments. A proper knowledge of taking pulse and respiration is essential.

After a myocardial infarction, it must be stressed that extreme caution and restriction of activities be followed, particularly from the 4th to the 14th day after the onset, for it is during this period that the infarcted myocardium frequently becomes soft and necrotic and prone to aneurysm formation and possible rupture. Walker,³ McDonnial,⁴ and many other workers have reported that approximately 10 per cent of deaths after myocardial infarction result from cardiac rupture which occurs during this crucial period. It appears that the incidence of cardiac rupture is increased by unrestrained activity. There is minimal danger of this complication after 30 days following the acute infarction.

Bedside Commode: In order to reduce further physical stress and activity, and at the same time give the patient a psychological boost, it is extremely advisable to institute early the use of a bedside commode instead of a bedpan. However,

the patient should not be told to get out of bed to use the commode, he should be helped and not dragged onto it. Benton, Brown, and Rusk⁵ have shown that there is much less stress and strain upon the patient during defecation when a bedside commode is used instead of a bedpan. These investigators have compared the energy expended in each situation and concluded that from a postural and energy-conserving standpoint, the strain necessary for defecation is lessened by the use of a commode, and that the energy expenditure in terms of oxygen consumption is 50.7 per cent higher on the bedpan than on the commode. For one who already fatigues easily, the use of the bedpan can be extremely exhausting.

"Armchair Treatment": It has further been observed clinically that it is much less trying and more relaxing for the cardiac patient to sit in a comfortable armchair at the bedside than to attempt to sit over the edge of the bed, even though his feet may be resting on a chair or stool and his back supported with pillows. The armchair further gives a greater sense of safety and security during such activities as eating, reading, and participating in other rehabilitation activities. Levine and Lown⁶ advocate the "armchair treatment" in selected patients after acute coronary thrombosis because of its beneficial physiological and psychological effects.

Shoulder-Arm-Hand Syndrome: A rather troublesome complication in patients with coronary heart disease is the shoulder-arm-hand syndrome. It occurs most frequently in the left shoulder, occasionally in the right shoulder, and rarely in both shoulders. The exact etiology of this syndrome is not known; however, it is thought that the immobilization of the shoulders resulting from the patient's or the doctor's fear of movement may be a factor. It appears to be a peri-arthritis. If it is not recognized early and treatment instituted, marked disability with impaired function of the entire shoulder and arm can occur. Pain is present and motion of the shoulder is limited, especially in abduction and external rotation. Continuation of the process causes pain, stiffness, and flexion

deformity of the fingers with atrophy of the intrinsic muscles of the hand, which is very disabling. It is our opinion that the shoulder-arm-hand syndrome can be prevented. A simple maneuver that can be started early without producing any undue exertion on the part of the patient is to have him slowly place his hands behind his head with the elbows fully abducted. This should be done two times, morning and night. If pain and restriction of motion already exists, heat prior to and during active and active assistive movements of the shoulder will be beneficial in correcting this condition. Ultrasound therapy or ethyl chloride spray may also be helpful.

Rehabilitation Program

In April 1952, Newman and associates⁷ reported for the period June, 1948 to March, 1952, a total of 527 patients ranging in age from 27 to 75 years with acute myocardial infarction who participated in a physical medicine and rehabilitation program with definite therapeutic accomplishments. That program has since been modified as shown in this paper.

The following outline of the rehabilitation program in acute myocardial infarction is to be used only as an activity guide. It is modified in complicated cases of myocardial infarction, as in those with residual cardiac or coronary insufficiency, and in other types of heart disease. At times the patient can progress more rapidly in his activities from week to week or it may become necessary to decrease temporarily the amount of activity.

Outline of the Rehabilitation Program in Acute Myocardial Infarction

(Use as a guide only)

1st Week — Bedside

If patient's medical condition warrants:

1. Orientation regarding rehabilitation program.
2. Relaxation therapy.
3. Diaphragmatic breathing.
4. Shoulder-arm-hand syndrome preventive exercises. (Slowly clasping hands behind head with elbows fully abducted, 2 times morning and night.)
5. Consider use of bedside commode. (Patient to be helped onto commode.)

2nd Week — Bedside

1. Slow active movements of the upper extremities starting with the fingers and hands, and the lower extremities starting with toes and feet. Start with 5 repetitions twice a day and gradually increase to 10 repetitions.
2. Simple self-care activities such as eating, brushing teeth, combing hair, and shaving.
3. Activities with limited and controlled physical exertion such as leather tooling, painting in water and oil, weaving, model kit assembling, photo tinting, stenciling, and using hand tools. Start with 15 minutes twice daily and gradually increase to 30 minutes twice daily.
4. Consider permitting patient to sit in armchair alongside of bed. (Patient to be helped into chair.)

3rd Week — In Patient's Room

1. Foregoing exercises continued.
2. Sitting in armchair alongside of bed, 80 minutes at mealtimes. (Patient to be helped into chair.)
3. Additional self-care activities, washing face and hands.
4. Second week activities using hand tools, gradually increase to 1 hour twice daily, permit patient to sit in bedside armchair.
5. Educational therapy, if desired and indicated, such as selective reading, writing, typing, etc.

4th Week — Progress to Physical Medicine and Rehabilitation Clinics

1. Foregoing exercises continued.
2. Bathroom privileges if facilities are in room.
3. Additional self-care activities.
4. Supervised walking in patient's room, 3 to 5 minutes twice daily; proper posture and gait.
5. Hand tool activities, such as drawing, plastic and wood projects, jewelry making, wire bending, etc. Toward end of week patient can be taken to physical medicine and rehabilitation clinics in wheel chair.
6. Vocational advisement and guidance if indicated.

5th Week — In Physical Medicine and Rehabilitation Clinics

1. Foregoing exercises continued.
2. Progressive walking, measured distances up to approximately 300 yards twice daily, depending upon patient's reactions.
3. Additional self-care activities such as dressing, bathing, and others.
4. Hand and power tool activities, both sitting and standing up to 1½ hours twice daily, such as ceramics, printing, wood and metal working (lathes, milling machines, circular saws, etc.), weaving, photography, assembling and repair of radio, television, and other appliances.
5. Start evaluation of patient's work capacity in a work situation approximating as much as possible the ultimate job environment and requirements. Vocational exploration.

6th Week — In Physical Medicine and Rehabilitation Clinics — Ambulatory

1. Foregoing exercises and walking continued.
2. Gradual progressive stair-climbing using handrail. By the end of the week, up and down a full flight twice daily. Rest periods as needed in a conveniently placed chair.
3. Performance of as many self-care activities as feasible.
4. Increased activities with hand and power tools up to 2 hours twice daily with increasing physical requirements.
5. Continued vocational exploration and work capacity evaluation to a known amount that can be correlated with specific job requirements.
6. Dietetic counseling before patient is discharged from hospital, especially those with diabetes mellitus, obesity, hypertension, and similar medical conditions.

Criteria for Guidance in the Rehabilitation Activities

1. Patient's general condition: Fatigue, faintness, sweating, etc.
2. Pulse: The rate, volume and rhythm of the pulse is taken for 1 full minute, prior to, at the completion of, and after a 3-minute rest period. If there is an increase of more than 10 in the rate or any change noted in volume or rhythm, the therapy is discontinued and this fact reported to the doctor.
3. Respiration: Character and rate of respiration is noted, and any unusual change reported.
4. Pain: If any chest, arm, or neck pain develops during activity, discontinue treatment at once and report. Further activity is resumed only upon recommendation of the doctor.

Treatment is promptly discontinued whenever any unusual signs or symptoms develop. This is reported immediately to the doctor and the information recorded in the patient's progress notes.

During the entire rehabilitation program, the patient must be carefully and periodically checked clinically including, whenever indicated, repeated laboratory tests and electrocardiograms.

The physical medicine and rehabilitation program for those with heart disease must be modified when there are associated disabilities such as hemiplegia with or without aphasia, other neurological conditions, amputations, rheumatic diseases, and other medical situations.

The cardiac patient who is also an amputee can be taught to ambulate with a pylon where no contraindication exists. This procedure will serve as a therapeutic test not only for his cardiac status but also as to the effect of ambulation on the remaining leg. Later, when indicated, he can be fitted with a proper artificial lower extremity.

The patient's activities may have to be modified further because of the existence of other conditions such as hypertension, obesity, and diabetes mellitus, which require close medical supervision and management.

The patient's activities while in the hospital or rehabilitation center, in addition to enhancing his work capacity, can also be exploratory, particularly for those who will be unable to return to their former type of employment. Prior to discharge, consideration should be given to future part-time work on his former or similar job, with a gradual progression to satisfactory full-time employment. If this is not feasible, on-the-job training should be considered. This procedure will serve as an extremely useful and practical work yard-stick.

The accompanying pictures of part of the rehabilitation program show patients with heart disease participating under close direction and supervision in activities simulating at least the physical requirements of various work situations. This type of participation will serve as a useful guide toward selective job placement.

Figures 1 to 5 are of patients with heart disease in various activities. Participation of this type aids in improving coordination, developing skills, and increasing work capacity. In those patients who cannot return to their former type of work, these activities serve as an exploratory means towards a vocational objective.

Figure 6 shows patients with heart disease exercising with pulley-weights and on a stationary bicycle starting with minimal resistance which is gradually increased according to the individual's overall condition. These activities aid in improving function and increasing work capacity.

Selective Job Placement

The success of any rehabilitation program that endeavors to return the maximum number of individuals with heart disease to productive living in business and industry, and the homemaker to her household duties, will depend a great deal on selective job placement. Most persons with heart conditions are willing and able to work. The individual's physical and mental abilities to perform must be carefully matched to the physical and mental requirements of the job under consideration. The over-all medical pic-



Fig. 1—Patient with heart disease participating in typing and operating other office machines to develop skills, increase work capacity, and as work exploration.



Fig. 2—Patients with heart disease participating in bench type of woodworking as an exploratory vocational activity while improving function and increasing work capacity.

ture is the keystone to any exploratory work objectives. Since nonemployment and having "time on one's hands" always emphasize and magnify the fears and anxiety frequently associated with heart disease, the earlier a person returns to a job the better he will feel. This leads to a more amiable and satisfactory home and community atmosphere.

In order to determine when the individual with heart disease can return to successful employment, a number of factors must be considered and evaluated:

1. Is the patient psychologically prepared and willing to resume work?
2. Can he return to his former job or similar type of employment?
3. Is he capable of full-time work or must he be restricted to a part-time situation?

4. Must he be limited to a sheltered workshop environment?
5. Will the work situation present problems resulting in "nervous tension" and anxiety?
6. Can he safely travel to and from his place of work each day?
7. Will there be a proper employer-employee relationship to minimize any misunderstandings and difficulties that may predispose to fear and to eventual frustration?

The answers to these questions are best forthcoming after a group evaluation by the internist, the physiatrist, the other medical specialists, the psychiatrist, the physical medicine and rehabilitation personnel (executive assistant, physical therapist, corrective therapist, occupational therapist, manual arts therapist, and edu-



Fig. 3—Patients with heart disease operating a printing press and a foot-operated potter's wheel. Mechanical ratchet counters are attached to these machines to check the number of movements that are made. These activities aim to improve function and work capacity, yet can also be useful for job exploration.

cational therapist), the psychologist, the vocational counselor, the social worker, the nurse, the dietitian, and all others contributing to the total rehabilitation effort. In those individuals who present special rehabilitation problems, a well functioning medical rehabilitation board can make significant contributions to-

ward the solution of some of these problems. Everyone's talents are needed.

With proper orientation, training, and selective job placement, workers with disabilities associated with heart disease, in the majority of instances, can be re-employed without any special concessions, sympathy, or the like.



Fig. 4—Patients with heart disease operating bicycle jig-saw and floor loom. This equipment has mechanical ratchet counters attached in order to check the number of movements made. The loom has weights attached to cables for graded progressive resistance to the movement of the beater. These activities are work exploratory and also aid in increasing function and work capacity.



Fig. 5—Patients with heart disease operating wood-turning lathe and circular saw, which aids in improving function, skills, and work capacity, and also serves to explore interest relative to future job situations. Note that the patients are wearing safety masks.

The United States Department of Labor, Labor Statistics Bureau,⁸ in 1948 published results of a study that gives a very good insight into the employability of cardiac patients. The work performance of 1,840 workers (1,557 male and 283 female) with cardiac impairment was compared with that of 3,055 unimpaired workers (2,613 male and 442 female) who were matched in the same jobs in 19 major groups in 104 industrial plants. Those with cardiac disorders when properly placed were not job handicapped. The report reveals that the cardiac patients had a slightly higher rate of absenteeism. They lost 4.7 days per 100 scheduled workdays as compared to 3.8 for the unimpaired worker. These individuals displayed about the same work characteristics as the unimpaired workers subject to the same incentives and exposed to the same hazards and were able to compete successfully. A rather significant feature revealed in this report is the very broad range and variety of skills represented. Only 5 per cent were found in unskilled custodial work such as porter, gateman, and similar occupations.

A comparison was made in the study

between the production of the impaired worker and that of his matched unimpaired co-worker on the same job. It is interesting to note that as a whole the impaired group, those with cardiac conditions, produced 2.4 per cent more than the unimpaired group. The facts reveal conclusively that cardiac workers competed successfully and did not only hold their own, but maintained a slight advantage in output as well. Those who gathered the statistics for the report raised a very interesting question which was not answered by the survey: "Whether the nature of the impairment generally causes earlier withdrawal from the labor market for reasons of health than is true of workers generally, or whether this kind of impairment—coupled with advancing age—raises a substantial barrier to employment." Further research and experience with employment of the cardiac worker will answer this vital question.

Some of the well over 1,000 jobs in which the cardiac worker was matched with his unimpaired co-worker are: Airplane mechanic, carpenter, laborer (automobile manufacturing, forging, machine shop, and others), sign painter,



Fig. 6—Patients with heart disease using pulley weights and stationary bicycle starting with minimal resistance. Note the mechanical ratchet counters on both pieces of equipment to check the number of movements.

pipe fitter, tool maker, chemist assistant, woodworker, automobile mechanic, die maker, forging-press operator, molder, patternmaker (metal, wood), tailor, cigarette-package examiner, cafeteria counterman, engine-lathe operator, sewing machine operator, shipping clerk, and many others.

The results of this study were extremely interesting and gratifying for it demonstrated the feasibility and practicability of employing individuals with heart disease when the criteria of selective job placement were fulfilled.

As a means of adequately evaluating and correlating the patient's physical and mental abilities with the demands of the job and in order to secure satisfactory selective job placement, the Veterans Administration has developed three guide forms: VB 7-1902i; 7-1902a; and 7-1902b. The appraisal of the physical and related capacities according to these forms are divided into three main groups:

1. Activities: Lifting, carrying, pushing, climbing, stooping, walking, sitting, turning, talking, hearing, smelling, vision (near, far, depth perception, color), and others.
2. Conditions: Inside, outside, extreme cold or heat, sudden temperature change, humid, wet, dry, noise, slippery floors, moving objects, electrical hazards, fumes, dust, and others.
3. Situations: Variety of duties, repetitive work, fast pace of work, following specific instructions, exacting performance, meeting emergencies, competitive work, working alone, working around others, and working with others.

These activities are further evaluated as to the patient's ability for "full," "partial," or "no capacity" to perform a specific activity. Other factors considered and graded are the amount of weight that must be lifted or carried in the performance of a certain job such as 1 to 10 lb., 11 to 25 lb., or over 25 lb., and the amount of time that the person is performing the activity. Many other items are listed on these VA Forms for guidance in the selection of the employment objective.

Crain⁹, in a study of 184 Eastman Kodak Company employees who had myocardial infarction, reported that almost 79 per cent returned to work, many for substantial periods of time. Of those who were working at the time this study was completed, 75 worked up to 5 years, 14 worked 5 to 10 years, and 5 worked from 10 to 15 years after their coronary occlusion. Those who died worked an average of 4½ years from the time that they returned to work until death. This was accomplished by cooperative effort between the company medical department and the patient's private physician. The patient usually returned on a part-time basis and, wherever possible, to his former job even though it was occasionally necessary to eliminate certain stressful features. When this was impossible, the employee was placed in a job that required less mental and physical effort than his previous position. After 2 to 3 weeks of part-time work, the employee was generally able to return to full-time work, but was closely observed by the medical department for several months, and subsequently had periodic check-ups scheduled every 3 to 6 months.

Crain further noted that as the employee group under consideration included trained employees, some highly skilled, as well as department heads and executive personnel, their capacity to return to work and to work for extended periods has been of importance to the company, as well as to the employees and their families.

Frequently the services of federal, state and community agencies will be quite helpful in planning a definite goal.

We have observed that at times the patient's work or his work environment must be modified so as to minimize psychological and emotional stress. It may be therapeutically wise when the cardiac patient is ready for employment to place him in a sheltered workshop situation, or part-time employment either on his former job or a newly selected job that better meets his requirements. The cardiac patient should be advised as to the importance of periodic re-examinations in order to safeguard his future. At re-examination it may be found advisable to change the amount or type of work.

Goldwater and his associates,¹⁰ in a study of 580 patients with various cardiac diseases, concluded that occupational activity does not necessarily lead to progression of heart disease or deterioration of the physical condition of the patient. As a matter of fact, a substantial number of patients with cardiac disease show improvement while in an employed status.

In considering selective job placement, it is interesting to note the study by Master and Jaffe¹¹ who investigated the mode of onset in 1,347 attacks of coronary occlusion. They obtained detailed histories of the activities of the patients during the 8 weeks preceding the attack up to its actual onset (table 1).

Table 1: Precipitating Factor in 1,347 Cases of Coronary Occlusion

Activity at Onset of Attack	No. of Attacks	%
Sleep	305	22.6
Rest	401	29.8
Ordinary Mild Activity	302	22.4
(dressing, getting out of bed, shower, sitting in theater, attending meeting, light housework, riding train or bus, etc.)		
Moderate Activity	117	8.7
(printing, pressing, driving car, bowel movement, coitus, shopping, climbing stairs, etc.)		
Walking	198	14.6
Unusual or Severe Exertion	24	1.9
(sports, lifting or moving a load, running, etc.)		
Totals	1,347	100.0

These figures appear to indicate that, in general, effort is not a precipitating factor in coronary occlusion. The study further indicated that occupation, social status, season of the year, and time of the day did not affect the incidence of coronary occlusion.

Richardson¹² similarly concluded that attacks of coronary thrombosis will occur at any time day or night, and are in no way related to the person's activity or emotional state. On the other hand, Yater and his co-workers,¹³ in their analysis of 689 attacks of coronary thrombosis in American soldiers, reported a greater incidence associated with strenuous activity. It appears, however, that the preponderance of evidence points toward a lesser incidence of attacks associated with strenuous activity.

For the homemaker with severe cardiac disability, the proper placement of the kitchen appliances (sink, dishwasher, cabinets, cleaning utensils, and others) will be helpful in decreasing physical exertion and increasing work efficiency.

Summary

Our experience since June 1, 1948, has shown that productive living for those with heart disease, with or without other associated disabilities, in most cases is a realistic goal through a physical medicine and rehabilitation program that is medically planned, directed, and supervised to meet the individual's specific needs.

Physical medicine and rehabilitation must be considered as part of the total medical care of those with heart disease; however, it does not supersede or supplant good medical management, for its greatest benefits are achieved when it is completely coordinated and integrated with the other medical and available ancillary services.

As soon as medically feasible, the patient with heart disease must be properly oriented and indoctrinated regarding his disease and his hospitalization, and also as to the rehabilitation program and his future. This will help alleviate many of the psychological and emotional reactions which result in fear, anxiety, apprehension, and lack of motivation.

Adequate participation in a well functioning rehabilitation program of patient orientation and progressive graded activities, will at the time of discharge afford both the patient and the physician a realistic appreciation regarding the individual's performed activities such as those of self-care, travel ability, and his physical and mental capacity for work.

The rehabilitation program at the hospital or center should simulate at least the physical demands of the job situation that the individual with heart disease will encounter, even though the psychological factors and environment are difficult to duplicate.

Selective job placement is vital in order to attain a well-planned goal. The patient's over-all abilities must be matched with the over-all job requirements. When the individual with a dis-

ability is selectively placed, he is not job handicapped.

Working hazards associated with occupations must be reduced not only for the person with heart disease but also for all workers.

Continued education of the patient, his family, friends, and employer, and the public in general as to the hopes and realistic goals for those with heart disease, coupled with further research, will bring additional gratifying results and a greatly improved outlook.

Improved medical care and rehabilitation for those with heart disease, in most instances, has increased the number of years of productive living, and may even have prolonged the actual years of life.

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Discussion

Erma A. Smith, M.D., Ph.D. (Hines, Ill.): Statistics presented in the paper by Newman, Wasserman, and Borden show the incidence of heart disease among various age groups, the percentage of total deaths attributed thereto, and the staggering effects of this affliction on the economy of our nation. Rehabilitation of patients with cardiac disabilities is thus brought to our attention as a major challenge.

Bed rest is a necessary part of treatment in the acute phases of cardiac disease, but the deconditioning effects of bed rest produce severe deterioration of the cardiovascular system. Decreased excursions of the diaphragm, venous engorgement, and increased capillary fragility, together with anxiety and tension states, operate in a vicious circle in opposition to the supposed benefits of decreased activity.¹

In attempting to alleviate some of these factors Newman, Baker, and others² formulated a cardiac rehabilitation program, which was put into effect June, 1948, at the Veterans Administration Hospital, Hines, Ill., as a part of the routine management of all patients with acute myocardial infarction.

The physical medicine and rehabilitation activities as well as the specific therapeutic measures have undergone evolution in the intervening years, but since inception of the program, physical medicine and rehabilitation has played its particular role in treatment of all veterans in our cardiac wards.

Psychological orientation and physical exercises are initiated as soon as is medically feasible, usually within the first week after infarction, and continued throughout the period of hospitalization, usually about 6 weeks.

To date 1,112 patients have been treated by the combined efforts of the cardiac and physical medicine and rehabilitation services at the Veterans Administration Hospital, Hines, Ill.

The physical medicine and rehabilitation program presented by Newman, Wasserman, and Borden is the activity guide; it is used to orient residents, therapists, nurses, and others regarding the over-all plan. Each patient is treated individually as to type and amount of activity; such complications as hemiplegia, amputation of a lower extremity, and hypertension require particular modifications. The activities are kept below the symptomatic threshold—that amount which induces dyspnea or pain. Periarthritis of the shoulder, a sequel of disuse, is prevented in our cardiac patients.

Since inception of the rehabilitation program, the incidence of anxiety neurosis is negligible in our cardiac wards; the transition from bed rest to ambulation is unusually smooth; the patients approach resumption of independent living with less fear and in better physical condition. Both the physician and the patient have a more objective concept of the patient's mental and physical capabilities facilitating more objective and realistic plans for the future. Our results convince us that physical medicine and rehabilitation activities add significantly to successful management of patients with heart disease.

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The Committee on Advances in Education is interested in receiving comments from Congress members relative to its activities. Suggestions should be directed to the Chairman, Donald L. Rose, M.D., Dir., Dept. of Physical Medicine, University of Kansas Medical Center, Kansas City 3, Kansas.

Rapid Mobilization of Cerebrovascular Accident Patients

Josephine J. Buchanan, M.D.

Washington, D. C.

In the past, the patient who sustained a cerebrovascular accident was considered to be a nursing problem rather than a medical problem. Because of this approach to his management, in most instances he did become solely a nursing problem by virtue of his resultant fixed disability from contractures, atrophy, and other degenerative physiological changes. The number of individuals so disabled has grown to enormous proportions and today constitutes the largest group of the disabled.

With modern medical treatment a larger number of these patients now survive, thus even further increasing the potential number of disabled persons. With survival comes the need for a broader medical program that includes not only physical restoration procedures but that also attempts to ascertain which patients have a favorable prognosis for return to a useful functional level.

As a result of some fine programs in several centers of physical medicine and rehabilitation in this country, more emphasis is now being placed on this aspect of the medical care of the patient with a cerebrovascular injury. It is now well-recognized that the success of such a program of treatment is directly related to the period of time elapsing after the onset of the hemiplegia and the beginning of physical medicine. By returning the patient to the activities of everyday life as soon as possible after his cerebrovascular accident two objectives are more adequately achieved—a more accurate evaluation of prognosis for return of function, and more rapid and complete return of functional and physiological well-being. Prior to or during this early activity, tests that can aid in determining prognosis should be devised. Much additional research needs to be undertaken in this regard. At this time we do not have

any well-defined criteria for determining prognosis; therefore, full programs of physical medicine and rehabilitation are prescribed for all cerebrovascular accident patients who are not moribund. These programs are continued until the patient's inability to respond is well-demonstrated over a substantial period of time.

Report of a Study

Treatment: In this study 234 patients were begun on physiatric treatment programs within one week after admission to the hospital with acute cerebral infarction. Unless the patient was obviously moribund, he was placed immediately on a tilt-table and his tolerance to an upright position was determined and redeveloped. The patient who is receiving hypotensive agents must be watched during this routine with great care as the vascular reflexes are usually abolished or diminished. Placing the patient on the tilt-table also serves to begin graduated partial to full weight-bearing as 90 degrees is approached. Thus two additional functions are achieved—reflex contractions of the muscles of stance and an increase in the strength of these muscles. Moreover, the cardiovascular and respiratory mechanisms are rapidly reconditioned and can meet the demands imposed by the upright position.

During this tilting phase of the patients' treatment other procedures are instituted, such as passive range of motion exercises, stretching of tight muscles, muscle re-education, and active-assistive,

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Assistant Professor of Physical Medicine and Rehabilitation, Georgetown University Medical School; Chief, Department of Physical Medicine and Rehabilitation, District of Columbia General Hospital.

active, and resistive exercises, as indicated by the patients' involvement. Uninvolved extremities are put through active and resistive exercises. A sling is applied, if needed, to prevent shoulder subluxation. Speech therapy is begun and the patient is sent to the occupational therapy section for training in self-care with the good arm.

As soon as the patient can tolerate 90 degrees on the tilt-table for 5 to 6 minutes, he is started standing in parallel bars. It is here that one may observe the effect of weight-bearing on the reflex contractions of the muscles of stance and locomotion. The majority of cerebrovascular accident patients who show no muscle function in the lower extremity on voluntary effort display such function with the stimulation of weight-bearing and attempted ambulation. It is therefore useless to depend entirely on muscle testing in the usual manner in determining ability to walk. The test must be that of standing and bearing weight. The knee may be easily splinted, if necessary, by the use of a simple fracture board or plastic shell used posteriorly and applied with elastic bandaging. A drop-foot may easily be supported by attaching ordinary rubber tubing to the shoe and to the elastic bandage around the leg. Bracing can thus be determined later when the final outcome is more evident. From this point on the usual gait and functional training are pursued. The hand and arm are exercised passively until function be-

gins to return and then physical and occupational therapy are actively pursued.

Results: The data on the 234 patients placed on this program of treatment are listed in tables 1 and 2.

The 28 patients (11.97 per cent) who were still unable to walk when discharged from the out-patient clinic averaged 63.5 years of age, whereas those who achieved ambulation averaged 55.9 years. The inability to walk was in every instance linked with a lack of mental recovery; however, in a few of those who achieved ambulation this mental lack was also observed. It is not known what the mental capacity was in these patients before they sustained their cerebrovascular accident.

Summary

Of 234 patients who were started on an active physical medicine treatment program within one week after their cerebrovascular accident, 88 per cent were able to ambulate independently 30.7 days (average) later. Of these, 51 per cent needed no supportive aids of any kind. Other, unmeasurable results observed were more rapid and complete clearing of the sensorium, better recovery of speech, more rapid and complete return of normal personality and drives, and a high degree of cooperation with the treatment program. There were no instances of a second cerebrovascular accident in these patients while undergoing the program, nor were there any cases of hypostatic pneumonia or phlebitis.

Table 1: In-Patient Care

Average Age	Average Hospital Days	Average Days Adm. to Ref. to P. M. & R.	Condition on Discharge from Hospital				
			Brace	Crutch	Cane	No Aids	Not Walking
56.9	27.6	8.9	9 (3.85%)	43 (18.38%)	30 (12.81%)	110 (47.01%)	42 (17.95%)

Table 2: Continuation Out-Patient Care

Average No. Visits Clinic	Condition on Discharge from Clinic				
	Brace	Crutch	Cane	No Aids	Not Walking
3.17	15 (6.41%)	34 (14.53%)	32 (13.67%)	125 (53.42%)	28 (11.97%)

Final Functional Result: 88.03% walking, 11.97% not walking.

Industrial Noise and How to Deal With It

Howard A. Carter, M.E.

Chicago

Noise is a hazard to industrial workers. In factories it is considered a "contaminant." Especially is this so in noisy heavy industries wherein the sound level is intense and damage to the middle and inner ear is a strong possibility. Repeated explosive outbursts, such as the exhaust of a jet engine or the concussions of heavy hammers on steel plates, are dangerously high noise levels. Any noise from concussion or from the explosion or expansion of gas that releases great amounts of sound energy will injure the ear.

Noise can be a nuisance, such as the din in city streets from heavy traffic, elevated lines, and subways, exhaust from trucks on the highways, and even noisy offices. These noises are disquieting but there is no evidence that they will damage the ear.¹ On the other hand, the continuous subjection to obnoxious noise in the range of 90 to 80 decibel levels can create a tiring effect on the occupants of the noisy place and sometime bring on a neurosis. Thus most of the noises with which one must contend in daily life are disturbing rather than traumatic.

Decibel: Noise is defined as any unwanted sound. The decibel (db) is the unit of sound level and is defined as one-tenth of a bel. The bel is a dimensionless unit for expressing the ratio of two values of power, the number of bels being the logarithm to the base 10 of the power ratio. This unit does not have any common reference point or standard, such as the finite distance between two marks on a metal rod representing the standard meter. In general, the change of sound level that can just be discerned by the human ear is a decibel. A person cannot usually distinguish a change up or down of one decibel, say from 50 to 51 db, but can definitely detect a change of two decibels; for example, from 50 to 52 db.

Sone: The sone is a unit of loudness. By definition a tone of frequency 1,000

cycles per second, 40 db above the listener's threshold produces a loudness of one sone. The loudness of any sound that is judged by the listener to be two times that of one sone tone is two sones. Three sones therefore would be three times the loudness of one sone.

The sone is a subjective unit for the measurement of loudness. It varies with different observers. It is judged by what a person hears. For example, table 1 illustrates the variation in estimation of loudness when compared with over-all sound level in decibels as measured on a sound level meter.

TABLE 1*

Machine	Overall Level, db	Total Loudness, Sones
Candy wrapper	100	160
Corrugator for Cardboard	100	280
Boiler room blower	100	260
Paper machine	105	300
Petroleum cracker	105	350
Shake-out (castings)	105	540
Shake-out area	114	790
Sheet steel riveter	114	1200
Pneumatic chipper No. 1	126	4100
Pneumatic chipper No. 2	127	5900
Riveting hammer	131	5400

* From, "A Noise Survey of Manufacturing Industries," American Industrial Hygiene Association Quarterly, December, 1953.

The sone, as a unit of loudness, is fairly accurate when the same type of operation is measured. Only then can statistical significance be attached to the readings. In the table the sone varies considerably from machine to machine even though in some instances the meter may record the same sound level. Only at 40 db and by definition do the

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Director of Biophysical Investigations, Council on Medical Physics, American Medical Association.

two units have the same numerical relation. Nevertheless, it seems likely that the sone will be a useful unit by which to measure noise. Unfortunately, an acoustical meter that will read in sones has not been perfected. *Phone*: The phone is also a unit of loudness level and at 1000 cycles per second it is numerically equal to the sound pressure level in decibels. The phone is not used very often.

Dangerous Noise Levels

The exact noise level that will cause permanent deafness to the ear has not been determined. It is believed that a noise at the level of 120 db is definitely hazardous to the ear and will cause irreversible damage. Some specialists believe that a continuous noise of 90 db level will cause deafness to workers that remain in its presence for a long time.² This has not been verified. A sound of 120 db would include noise from airplane motors in test chambers, jet engine exhaust, pneumatic rock drills, airplane motors at 20 feet distance, and auto horns at a foot distance. Organic changes can take place in the inner ear which, though reversible in the early stages, often lead on continued exposure to permanent injury with consequent partial deafness; then the injury is irreversible. Workers that are subject to these extremely noisy environments should have protection for the ears. Guild³ points out that there is no evidence, and no good reason to believe, that the hair cells of the organ of Corti once destroyed are ever replaced or regenerated.

Sound Level Meter

Several makes of sound level meters are marketed. They are operated by 115 and 120 volts A. C. line current or are self-contained and operated by batteries. Information on this subject can be obtained by writing to the publication *Noise Control*.⁴ The higher frequencies of the noise are more apt to cause impaired hearing than lower frequencies. To make a good analysis of a noisy environment, the frequency characteristics of the noise should be known. When the higher frequencies are predominant in a

disturbing noise, it is more probable that a program of ear protection is needed than if the noise is dominantly made up of low frequency vibrations.

Reduction of Noise

The most satisfactory way of solving a noisy condition is to move away from the source or vice versa. The sound level decreases in a free space inversely as the square of the distance, or approximately 9 db every time the distance is doubled. Since moving away is not practical in most instances, other methods of solving the problem should be considered. For example, a noisy machine can be quieted by mounting it on shock absorbing supports that are made of springs, rubber, or other resilient material. The shock absorbing mounts will absorb the vibrations and not transfer the energy to the building so much. To inhibit the propagation of sound through air, a heavy material must be used for the barrier since the attenuation of the sound varies as the mass. Thus, a noisy machine can be encased in substances of mass such as brick or concrete.

If the space has a high reverberant condition, sound absorbing tile may be used. These tiles are placed on the ceiling and walls and help to absorb the energy that would otherwise be reflected.

Ear protectors are used when all other methods prove inoperative or ineffectual. Ear protectors are made of plastic, rubber, or artificial rubber compounds. They are shaped in such a way that they can be inserted into the ear canal. They can also be made in the form of muffs which will cover the ear. Glorig and Wheeler⁵ have said that the best ear protector is the one that is worn. One of the most difficult problems is to devise ear protectors comfortable enough so that the workers are willing to wear them.

If the noisy apparatus is in a highly reverberant enclosure then the reduction of the high frequency noises can be achieved by using acoustical tile or soft porous materials on walls and ceilings. The sound conditioning tiles absorb sound and reduce reflection but they do not have any significant effect on the transference of sound. Only mass will

aid in this reduction.⁶ Acoustical tile and other wall sound-reducing material will reduce the annoying high pitched sounds in restaurants, factories, and offices. Reduction of the reverberant noise in many instances will make the enclosure more comfortable to work in. Although the use of the absorbing materials on the walls will make the room seem more quiet, it will probably be found that the background noise has not been greatly reduced as read on a meter, but the noise seems less because reflection of the sound is reduced. An analogy with light will clarify this phenomenon. A light source in a room with either light or dark walls might be comfortable, but if the walls and ceilings were lined with looking glass then the light source would have many reflections. These reflections would be an annoyance to one's seeing acuity; however, the total amount of light in the room remains the same. Walls that do not harshly reflect the light render a space more comfortable to the eyes. Walls that absorb sound are more comfortable to the ears.

While this paper mentions several basic principles of the sound problem, it should be stressed that the practical application of these principles is not simple. Acoustical experts should be consulted to solve difficult problems.

In a recent book on the subject, Beranek has reviewed the subject of acoustics and noise and has summarized the essentials in everyday language.⁷ Davis, a physician, gives the medical point of view in his book for laymen.⁸

Medico-Legal Aspects

In recent years the problem of industrial noise and its effect upon hearing has received considerable legal attention. Two of the earliest cases recorded to reach appellate courts, both in the railroad industry, occurred in 1917 and 1918. One concerned a locomotive fireman who was adjusting a whistle on the engine. The engineer, contrary to warnings, blew the whistle and the fireman suffered loss of hearing, caused by shock. The Florida Supreme Court reversed a judgment for common law damages. The other case concerned a boiler-

maker's helper who performed his duties inside of a tank by holding a heavy piece of iron against one end of the rivet while an air hammer was applied to the other end. His hearing was damaged from the loud noise. His judgment for damages was affirmed by the Nebraska Supreme Court. Since then more and more applications for compensation because of alleged damage of workers' hearing have been coming before the courts.⁹

The seriousness of the problem of occupational deafness cannot be over-emphasized. It may be compared with the silicosis problem of a few years ago which became a focal point for filing suits on industry by workmen. The hard-of-hearing problem in industry is more serious for several reasons. Firstly, noise is more prominent in industry than silicosis because fewer industrial organizations are stationed near atmospheres that contain harmful concentrations of silica. Secondly, it is more difficult to handle industrial deafness because of the complexity of the acoustical, electrical, and mechanical problems. Thirdly, the coverage of the Workmen's Compensation Laws is infinitely greater than it was some 20 years ago. It has been estimated that litigations amounting to from three million to two billion dollars are pending with Workmen's Compensation Boards or Commissions.¹⁰ Because the problems have not been solved and not all the questions have been answered, many of these applications for compensation have not been granted. It is the opinion of many specialists that if the Workmen's Compensation Boards of a few states should start granting awards there would be a demand in other states for equal compensation. New York has been a leader in this field.¹¹ The Workmen's Compensation Law (1910) of New York originally provided benefits only for accidental injuries. In 1920 the law was amended to cover occupational diseases arising in specified or described operations. In 1935 it was further amended with a so-called all-inclusive occupational disease clause that provided coverage for any and all occupational diseases. Unfortunately, the New York legislature did not define what constitutes

occupational disease. Thus, for several years there have been a number of efforts to challenge occupational hard-of-hearing or deafness as an occupational disease.¹²

The state of Wisconsin has been very active in the formulation of laws for compensation of persons handicapped by industrial deafness.¹³ One of the difficult problems that has not been solved is the proportion of injury to hearing caused by presbycusis, since hearing can gradually grow worse while a person is in a noise level that might not be injurious. This is an important question to settle because industry might be compelled to pay not only for the occupational loss but also for senile losses.

Another important problem that is not settled is an acceptable method for the calculation of the percentage loss of hearing. The authorities do not agree. The American Medical Association method¹⁴ has been available for 10 years but certain aspects of it do not seem to be in line with present evidence on hearing loss; thus, the Committee on Noise of the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology and the Council on Medical Physics (formerly Physical Medicine and Rehabilitation) of the American Medical Association are devising a new method for calculation of percentage loss of hearing or will revise the former one.¹⁵ Physicians practicing rehabilitation may wish to extend their services to the conservation of hearing. Information on this subject may be obtained from the Committee on Conservation of Hearing.¹⁶

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Any member of the American Congress of Physical Medicine and Rehabilitation wishing to submit the name of an individual for consideration by the Gold Key Award Committee, may do so by sending such information to the Committee Chairman, Donald L. Rose, M.D., Dir., Dept. of Physical Medicine, University of Kansas Medical Center, Kansas City 3, Kansas.

Any nomination must be substantiated by the sponsor's opinion as to why this high award should be conferred on the individual so named.

Double Spring Exercises

Joseph Berkeley, M.B., Ch.B., M.D. (Glasgow), D.P.H.

Canada

Active exercises are the basic ingredient of most modern physical medicine prescriptions. Many patients, however, do not exercise adequately, especially lazy, apathetic or apprehensive patients. These exercise-resistant patients are a familiar problem in all physical medicine departments and rehabilitation centers. Such patients need encouragement; the term "encouraged exercises" has already been suggested for remedial exercises that are designed to encourage active participation by the patient.¹ It is hoped that this paper will draw attention to a field of study that has been explored largely in occupational therapy, but insufficiently in physical therapy, namely, the use of motivating devices in remedial exercise therapy.

The double extension spring method, a motivating device for exercise-resistant patients, is a variation of the single spring oscillating exercise described by Guthrie-Smith.² As applied to multi-repetition exercises for the stiff knee joint, in order to improve co-ordination and to lessen adhesions, the method is as follows.

Method

The patient sits comfortably on a bench. A leather anklet with ring attachments in front and behind is strapped on the ankle, and extension springs are attached to the rings in front and behind the ankle. The other ends of the springs are fixed on the wall in front and on the floor behind the patient, placed so that the line of both springs and their direction of pull corresponds to the arc of movement of the ankle between knee flexion and extension. Each spring has an adjustable strap to vary the tension (see figure 1).

To begin the exercise the knee is placed at its maximum position of flexion and the strap of the floor-spring is adjusted so that the spring is held taut but in the unstretched position. The knee is

then extended fully, and the strap of the wall-spring is adjusted likewise. The thigh is now strapped comfortably to the bench with a broad, well-padded cuff of leather or canvas.



Fig. 1—Double spring exercise for knee. Note the adjustable strap on each spring, the wide, padded, thigh strap, and the supervision of the multi-repetition exercise by the therapist.

Under supervision of the therapist, the patient begins his multi-repetition exercises. He is told to flex the knee and extend it repeatedly to the full limits of his range of movement. It is essential that the straps be properly adjusted, that the patient be relaxed and comfortable, that he exercises through his full range of movement, and that the therapist supervise the exercise. Under these circumstances most patients rapidly fit into a quick rhythm of exercise.

The usual exercise period is 15 minutes once or twice daily. In each period most patients will perform 500 to 1,000 repetitions.

Read at the Annual Meeting of the Canadian Association of Physical Medicine and Rehabilitation, June, 1953.

Acknowledgment: The author is grateful to the Workmen's Compensation Board of Ontario for permission to publish this paper; to Dr. Bruce Young, Medical Superintendent for his encouragement and provision of facilities, and to the staff of Malton Rehabilitation Centre who assisted in this study.

tions. Variation in the use of the circuit is possible. For some patients with a lack of extension, the tension in the upper spring can be increased or two springs can be used here. It should be noted that high-repetition, low-resistance exercises are being used to increase the range of movement, in contradistinction to the use of low-repetition, high-resistance exercises to build muscle power.

Analysis of the Exercise: In one complete flexion-extension movement, at each limit of movement, the recoil force of a stretched spring is brought to bear on the limb so as to encourage the commencement of movement. At the mid-range the force of both springs is equal; after the mid-range, the opposing spring exerts a small resisting force that must be overcome by the patient's active movement. Thus, each spring performs two roles, assisting one movement and resisting the other, the spring that is the assistance to flexion being the resistance to extension, and vice versa. The effect of the assistive spring force is to encourage the repetition of exercises and of the small resistive force to ensure that the exercises are actively performed.

Indications: The double extension spring method is recommended for patients who require much encouragement to perform active exercises; for patients with poor muscular co-ordination; and for patients with limitation in knee joint movement resulting from adhesions in and around the knee joint or the muscles controlling it as a sequel to fracture of the femur, patella, or tibia, or because of dislocation of the knee, torn knee ligaments, or meniscectomy.

Contraindication: The method described is contraindicated in conditions in which knee movements are painful, such as osteo-chondritis, acute or sub-acute arthritis, inflammatory processes, loose bodies, or torn meniscus.

Discussion

In 1952, 36 patients with limited knee movement were treated at Malton Rehabilitation Centre by this method. More than half of these patients stated that they liked the treatment; three asked for further treatment periods. The others

accepted the treatment without comment, with the exception of two patients with osteochondritis in whom the treatment had to be discontinued because of pain. The method is thus acceptable to the patient.

Whether the use of double spring therapy produces a faster gain in knee movement than the use of active exercise therapy given by physical therapists and remedial gymnasts would seem to depend on whether a particular patient will respond to the additional encouragement afforded by springs better than to the encouragement of therapists. The other variables on which the rate of increase in movement depends are quantity and quality of the adhesions that limit movement. It is obvious that both these variables are most difficult to measure and control for purposes of evaluation.

A larger number of cases would be required in order to show the efficacy of this method statistically. My clinical impression is that it is a useful motivating device in selected patients.

Elbow and Shoulder

The method also has been applied to encourage performance of flexion-extension exercises at the elbow and rotation exercises at the shoulder. For elbow exercises the patient is seated with his arm supported on a pillow on a narrow table. The forearm is in mid-position. The springs are attached to a forearm cuff, to the floor in front of the patient, and to the wall behind him.

To exercise the shoulder rotators, the patient lies on a plinth in the supine position. His arm is strapped to the plinth in the abducted position by a broad cuff, and the two springs are attached by a forearm cuff to points on the horizontal plane above and below the shoulder. Preliminary results for painless stiff elbow and painless frozen shoulder have been quite encouraging.

Summary

Attention is drawn to the problem of exercise-resistant patients, and need for further study of "motivating devices" in remedial exercise therapy. A simple method using two extension springs is

described. The springs themselves provide encouragement to the patient to repeat the performance of active exercises. The encouraging effect is provided by recoil force of the stretched spring, which operates only at the beginning of each to and fro movement. The requirement for active movement is provided through a small resistive force of the springs that must be overcome at the end of each movement. The double spring method has been used at Malton Rehabilitation Centre, Ontario, mainly in stiff knees following trauma and immobilization, and in stiff painless elbows and shoulders. The treatment was quite acceptable to the patients, except those with painful

joints in whom multi-repetition exercise is contraindicated.

In the exercise period of 15 minutes, 500 to 1,000 repetitions are performed. For best results, both spring tensions must be adjusted initially so that movement through the complete range can be performed comfortably, the patient must exercise through his full range of movement, and the performance of the exercise must be supervised.

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EASTERN SECTION TO MEET—

Saturday, April 7, 1956, is scheduled for the Spring Session of the Eastern Section of the American Congress of Physical Medicine and Rehabilitation. The meeting will be held at Hotel Adelphia, Philadelphia.

PRELIMINARY PROGRAM

An Evaluation of Vasodilating Measures in Peripheral Arterial Insufficiency
Irwin D. Stein, M.D., New York City

A New Physical Method of Increasing Peripheral Circulation in the Presence of Insufficiency
Nathan Steinberg, M.D., Philadelphia

Discussion: *Karl Harpuder, M.D., New York City*
Joseph B. Wolfe, M.D., Philadelphia

Medico-Legal Aspects of Physical Medicine
Albert Geller, M.D., LL.B., New York City, and Milford Meyer, LL.B., Philadelphia

Detailed information regarding this meeting may be had from the
Secretary, Harold Lefkoe, M.D., 1006 Medical Tower, Philadelphia 3.



DISRAELI W. KOBAK, M.D.

1888 — 1956

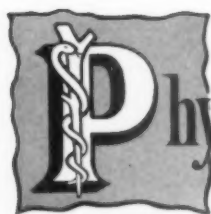
In Memoriam

We regretfully record the passing of Doctor Disraeli W. Kobak on February 17, 1956. He was head of the physical medicine departments at Cook County Hospital and Oak Forest Infirmary in Illinois.

Doctor Kobak was a pioneer member of the American Congress of Physical Medicine and Rehabilitation; he served as its President in 1926. He was a charter member of the American Academy of Physical Medicine and Rehabilitation and was a diplomate of the American Board of Physical Medicine and Rehabilitation. He devoted years of service as Editor-in-Chief of the *ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION* and was later appointed Editor Emeritus of the journal.

In recognition of the value of his contributions in the field of physical medicine and rehabilitation, he was awarded the ACPM&R Gold Key in 1940. The Belgian Government recognized his achievements and decorated him as Knight Commander of the Order of St. George; the French Republic decorated him as an officer of the French Academy with the grade of University Palms.

The loss of Doctor Kobak will be keenly felt by all; he leaves a gap in the ranks that will be difficult to fill.



Physical Medicine Abstracts

Spectral Reflectance of Human Skin in the Region 235 - 1000 Mu. J. A. Jacquez, and H. F. Kuppenheim. J. Appl. Physiol. 4:523 (Mar.) 1955.

Most available data on the erythema-producing, burn-producing, and tan-producing effectiveness of various wave lengths of light are generally given in terms of radiant energy incident on the skin surface. More information could be obtained by studies of the energy absorbed at various depths from the skin surface.

A Beckman DU spectrophotometer with an adapted integrating sphere was used. Wave lengths in the range of 235 - 1000 Mu were tested.

Spectral reflectance studies on two subjects seemed to indicate an absorption band present in the area of 340 - 350 Mu. Goldzieher previously suggested this may be a hemoglobin band.

The authors also confirmed the work of Hansen that fluorescence contributed very little to the transmission of ultra-violet light through the skin.

The authors conclude that the major absorption bands are well established. In the range of 300 - 1000 Mu there is considerable variation of skin reflectance. However, there is little variation in the 235 - 300 Mu range indicating that reflectance is minimal and that most of the energy which penetrates deeper than the very superficial layers is absorbed.

Non-Operative Treatment, Including Manipulation, for Lumbar Intervertebral Disc Syndrome. Merrill C. Mensor. J. Bone & Joint Surg. 37-A:925 (Oct.) 1955.

Patients with diagnosed lumbar intervertebral disc syndrome were treated conservatively with the addition of manipulation; 205 of these patients were available for final analysis over a ten year follow-up period. Diagnosis was based on the history and clinical findings. The technic of manipulation is described. Contraindications to this technic are defined. End results were classified as excellent, good, fair, immediate failures and delayed failures according to definite criteria. The patients were divided into two groups, private and industrial. Forty-five per cent of the industrial patients and 64 per cent of the private patients had satisfactory results.

Twenty-seven per cent of the patients finally had to undergo laminectomy. Seventeen were private patients and 39 were industrial patients. By the use of the same clinical criteria, 58 per cent of the private patients had satisfactory results from laminectomy but only 23 per cent were completely relieved. About 45 per cent of the industrial patients had satisfactory results.

Generally there was a higher percentage of complete symptomatic relief following manipulation than following surgery. There was also a lesser amount of permanent disability in those cases in which residual disability persisted. The apparent discrepancies in end results between the private and industrial cases were presumably related to the monetary factor and the larger percentage of industrial patients engaged in heavy labor.

Unfortunately, there is no series of standard conservative treatment to compare with the results of manipulative treatment. Moreover, the diagnosis of herniated lumbar intervertebral disc is certainly suspect in some of the cases in the series since the author did not do either a myelogram or a discogram routinely before undertaking treatment. He merely stated that 23 per cent of the patients in his series showed demonstrable roentgenographic disc changes prior to the beginning of treatment, and that clinical findings and history warranted making the diagnosis.

Spectral Reflectance of Human Skin in the Region 0.7-2.6 μ . John A. Jacquez; John Huss; Wayne McKeehan; James M. Dimitroff, and Hans F. Kuppenheim. J. Appl. Physiol. 8:297 (Nov.) 1955.

The authors present data on the reflectance of living human skin for the range 0.7-2.6 μ since this range is of major interest in the study of radiation burns. The spectrophotometer used to make the measurements has not yet been completely described.

Reflectances were measured on the skin of 11 young white males, 1 young white female, 4 negro males and 2 young Japanese males. Above 1.2 μ the reflectance curves of the differently pigmented subjects are practically identical and show primarily the absorption spectrum of water. Striking differences appear below 1.2 μ which are related to differences in skin pigmentation and which corroborate the fact that darkly pigmented skins show less reflectance than light skins.

The Treatment of Iron Deficiency Anemia. Daniel H. Coleman; Alexander R. Hevens, Jr., and Clement A. Finch. *Blood: J. Hemat.* 10(6):567 (June) 1955.

It is the purpose of the authors to review the important features of iron metabolism and the pathogenesis, diagnosis and treatment of iron deficiency anemia.

In the normal individual the iron absorbed and lost from the body daily is very small—about 1 mg. in the normal male on an average diet. Certain periods in life create a demand for more iron. These are infancy and adolescence. In infancy, iron stores are rapidly depleted because of the expanding red cell mass and rapid tissue growth. In this period dietary intake of iron is often poor. After adolescence when a full complement of iron has been stored there is very little iron turn-over. The adult becomes independent of iron intake and becomes iron deficient only through blood loss.

Menstruation, pregnancy and lactation may increase iron needs to the extent of 2-3 mg. daily rather than one.

Before anemia appears iron stores must be exhausted. In a case when diagnosis from usual laboratory methods is not certain, examination of the marrow for hemosiderin will help establish or reject the condition. Confirmation should be made by specific therapy and search for the cause of the depletion.

Response to oral iron is usually very good. Failure may indicate mistaken diagnosis, concurrent blood loss, lack of absorption of ingested iron, or refusal by the patient to take medication.

Parenteral administration has uses in a small group of patients where intolerance of oral iron, gastrointestinal disease, or poor absorption plays a role. Sometimes reconstitution of the iron stores is desirable. Oral iron while effective in anemia does not reconstitute stores. Saccharated oxide of iron in doses to restore a calculated 1500-3500 mg. iron depletion has been used intravenously for this purpose with excellent results. This depletion is the result of loss of iron from serum, red cells, bone marrow and other tissues.

The Use of Prednisone (Meticorten) in Respiratory Disease. II. Pulmonary Emphysema and Pulmonary Fibrosis. Hylan A. Bickerman; Gustav J. Beck, and Alvan L. Barach. *J. Chronic Dis.* 2:247 (Sept.) 1955.

The authors' purpose was to study the effects of prednisone in 50 patients with pulmonary fibrosis and/or emphysema.

In 86 per cent of the patients there was moderate to marked improvement with relief of dyspnea and improved exercise tolerance.

This was borne out by improvement in respiratory function tests. Daily dosage was about one-quarter of that employed when cortisone was used. Onset of improvement was usually within 48 hours—more rapid than with cortisone.

Weight loss from 3-9 pounds occurred in 12 of the patients during the first week of therapy. Four of these patients had pulmonary fibrosis, had not previously been treated with cortisone, and had no clinical evidence of cardiac failure. A possible source of this weight loss was edematous inflammatory tissue in the lung. It was also speculated that relief of hypoxia through better ventilation and increased tissue oxygen tension might have decreased capillary permeability. This would result in diuresis similar to that produced by oxygen inhalation in cardio-respiratory disease.

Adverse effects such as gastrointestinal disturbances and reactivation of sinobronchial infection were noted. Facial mooning, however, occurred less often with prednisone than with cortisone.

The Neurogenic Control of the Blood Vessels. S. Rodbard, and L. N. Katz. *Circulation* 12:448 (Sept.) 1955.

Control of the blood pressure of the body is regulated by the delicate balance of vasodilatation and vasoconstriction. Vasodilatation is controlled primarily by peripheral mechanisms; vasoconstriction is under central control. The distribution of the cardiac output is under the control of the vasomotor center of the medulla oblongata which responds to peripheral impulses.

The physiological need to control the degree of vasoconstriction has led to the development of a very complex regulatory mechanism. These controlling mechanisms act both locally and at a distance through both neurogenic and neurohumeral pathways.

One method of control can be illustrated by the response of graded compression of the brain. An acute increase in intracranial pressure initiates a threefold response—1) direct neurogenic vasoconstriction, 2) release of a pressor material (nor-epinephrine), and 3) increase in the circulating blood volume.

The importance of the hypothalamus as a regulating mechanism is discussed and the differences between epinephrine and nor-epinephrine are also mentioned.

Hypotensive blocking agents are in vogue today in an attempt to control blood pressure. Most of the drugs in use act centrally. However, there are some which act peripherally as blocking agents at the autonomic and even at the vascular level.

This article reviews the problem of neurohumeral control of the circulatory system quite adequately but sheds little new light on this complicated subject.

The Significance of Spinal Fluid Protein Level in Intervertebral Disk Pathology. S. M. Albert; A. M. Rechtman, and V. Kremens. *Pennsylvania M. J.* 58:1235 (Nov.) 1955.

Since diagnosis of disk protrusion sometimes can be made only by surgical exploration, only cases proved in this manner were used for comparison with spinal fluid findings. Operative findings in the 71 patients finally considered in this study were 32 disk lesions at the fifth lumbar interspace, 27 at the fourth lumbar level, 5 at both the fourth and fifth lumbar level, one at the third lumbar level, and 6 negative. Of the 59 patients with disk lesions at either the fifth or fourth lumbar level, 56 per cent had spinal protein levels above 40 mg. per cent, whereas 4 of the 5 patients with lesions at both these levels had elevated spinal protein levels, but the levels were only 48 to 58 mg. per cent. The value for the patient with the disk lesion at the third lumbar level was 29 mg. per cent. Of the 6 patients with negative laminectomies, only two had elevated levels. Patients with spinal fluid protein levels of 40 mg. per cent or less had symptoms for an appreciably longer period than those with high levels. Thus, there appeared to be no correlation between protein level and location or size of the protrusion, neurologic aberration, or duration of symptoms.

Roentgen Therapy of Subdeltoid Tendinitis and Bursitis. M. Shoss, and T. G. Otto. *J. Missouri M. A.* 52:855 (Nov.) 1955.

A follow-up study of 159 patients with subdeltoid tendinitis and bursitis treated by intermediate x-ray therapy is presented. The series included both chronic and acute cases, with and without calcific deposits in the tendon structures. Also discussed are the anatomy of the shoulder; the etiology, pathology, and diagnosis of bursitis, and other forms of treatment including needling, drug therapy, surgical excision, and physical therapy. The authors prefer x-ray therapy since it requires the least effort by the patient and physician, is of less discomfort to the patient, and is economical. In the cases reported, essentially the same technical factors were used: 140 KV, 15 MA, 50 CM-TSD, $\frac{1}{4}$ mm. copper, and 1 mm. of aluminum (HVL 0.5 mm. copper). The majority of patients were treated with 150 r in air to alternate anterior and posterior ports (15×15 mm.) to the shoulder on alternate days for a total of six days and a total dosage of 450 r to each port. Preliminary results of the study were re-evaluated to eliminate patients for whom follow-up or therapy was inadequate or in whom the condition was too far advanced to respond to radiation therapy. In the final results, 149 patients were included; satisfactory results were obtained in 96.6 per cent of

those with acute bursitis and in 91.8 per cent of those with chronic bursitis. Satisfactory results were obtained within one week in 45.7 per cent of the acute cases, within three weeks in 69.3 per cent, and within three months in 93.2 per cent. Only 3.4 per cent required 4 to 6 months to obtain relief. In the chronic cases, satisfactory results were obtained in 15.5 per cent within the first week, 36.9 per cent within the first three weeks, and 70 per cent within the first three months. Final results in 15.3 per cent were not achieved until 4 to 8 months.

Spectral Reflectance of the Skin of Rats and Rabbits in the Region 420-1000 Mu. James M. Dimitroff; John A. Jacquez, and Hans F. Kuppenheim. *J. Appl. Physiol.* 8:292 (Nov.) 1955.

The authors present spectral reflectance data on rabbits and rats for the range 420-1000 Mu.

The experimental animals were New Zealand white rabbits, chinchilla rabbits and Sprague-Dawley albino rats. The skin area used for measurements was the outer aspect of the right thigh. The General Electric Recording Spectrophotometer was used in the normal (400-700 Mu) and extended (440-1000 Mu) range.

The shapes of the reflectance curves of rat and rabbit skin are similar. The percentage reflectance for 5-7 month old white New Zealand rats was less than that for 12-15 month old rats of the same species throughout the measured range. There may have been greater light absorption in the skin of the younger group or greater back scattering in the skin of the older group.

The spotty distribution for reflectance and absorption in chinchilla rabbits was attributed to an irregular spotty distribution in pigment. The reflectance of the albino rat's skin was much lower than that of the albino white rabbit. The rabbit has a fur which is very fine and dense when compared to that of the rat. Consequently there is a greater amount of scattering of radiation from the hairs near the skin surface in the rabbit.

The effect of environmental temperature on furring and the relative absorption in epidermis, dermis, and blood vessels are factors which should be considered in more detail.

Stress and the Aging Circulation. N. P. Larsen. *Am. Pract. & Digest Treat.* 6:1681 (Nov.) 1955.

Senescent arteriosclerosis is caused by a chemical change in the arterial wall resulting in deposits of calcium, lipids, proteids, and other matter, which increase with age. It does not necessarily produce clinical symptoms. In atherosclerosis, the most common form of arteriosclerosis, lipid material pro-

ducing yellow, rubber-like plaques is deposited in the intima of the arteries, which may calcify and ulcerate, and results in decreased blood supply to various organs and tissues. Aging is associated with atherosclerosis but does not cause it. The first plaque is often found at birth in the region of the ductus arteriosus. Important influencing factors are heredity, sex and age, certain diseases, hypertension, and diet. Basic conditions necessary for the disease process are a certain level of arterial pressure, some change in the circulation of the arterial wall, a rise in the cholesterol content and phospholipid ratio, and certain inhibiting factors that may influence the others, such as estrogen or heparin. Evidence suggests that an increasing amount of atherosclerosis is affecting younger people. Every disease in which the cholesterol and the cholesterol-phospholipid ratios are high in the blood is associated with heavy atherosclerosis. When these ratios are high, the alpha lipoprotein is low and the beta lipoprotein high, a chemical condition that is probably atherogenic. Animal fat in the diet may be a very important factor in developing atherosclerosis as there appears to be a low incidence of coronary sclerosis in countries where the usual diet is low in animal fat.

Effects of Training on Response of Cardiac Output to Muscular Exercise in Athletes. M. E. Freedman; G. L. Snider; P. Brostoff; S. Kimelblot, and L. N. Katz. *J. Appl. Physiol.* 78(1):37 (July) 1955.

The purpose of the authors was to determine whether training in cross country running would change the ways in which oxygen uptake in the body could be increased in mild to moderately severe exercise.

The subjects for the experiment were three members of a college cross country team—one already in training for a month at the time of the study. The other two had not done any systematic training for at least three months prior to the study.

Technics and methods involved are described. The subjects performed three or four graded exercises on a bicycle ergometer in the horizontal position for seven minutes each. These exercises were repeated at the end of the cross country season about two months later. Respiratory function tests were also made.

The authors concluded that there was no difference in the way trained and untrained athletes met the increased demand for oxygen—that both the increase in cardiac output and the arterio-venous oxygen difference played an equal role. They did admit that differences between a sedentary individual and an athlete might be greater. They were also aware that their trained athletes were not called on to give maximal performances in terms of severity of exercise. Moreover, they also realized that "local tissue factors"

may play a role, not measurable at present, which would account for benefits of training. In any event an experimental group of three leaves their conclusions open to question.

In one isolated case training was found to produce no increase in mechanical efficiency. Pulmonary systolic, diastolic and mean pressures increased in response to all grades of exercise. Maximal breathing capacity increased as a result of training and there was an increased ventilatory efficiency at all grades of exercise. Electrocardiograms suggestive of right bundle branch block were thought to be the result of overloading of the right ventricle during exercise.

Two of the subjects were recovering from diarrhea at the time of catheterization. It should be noted also that the exercises were performed in the horizontal position. Both of these conditions may have tended to minimize the effects of training. One would also like to know the severity of cross country training as compared to the severity of the test exercises.

The Incidence of Infection Among Contacts of Poliomyelitis Cases. D. M. Horstmann; R. W. McCollum, and A. D. Mascolla. *J. Clin. Invest.* 34:1573 (Oct.) 1955.

A number of studies have been carried out over the years concerning the incidence of poliomyelitis among contacts of active cases. However, only recently, with the introduction of tissue culture methods has it been possible to carry out extensive surveys.

The authors conducted their study in two Ohio counties during an acute epidemic in 1952. The contacts of reported cases of poliomyelitis were divided into two groups, those in the same family group and those outside the immediate family but who had daily contact with the index case. Throat and rectal swabs, blood samples, and stool specimens were collected whenever possible. Most of the cultures were grown on monkey kidney tissue.

In comparing results between the two groups, the authors showed that the incidence of infection in the immediate family group may be much higher than previously reported. Of 54 familial associates, 24 were found positive for the family type of virus, and 25 (83%) of those from whom no virus was isolated already had antibodies. These figures compare favorably with results obtained by Brown, Rabson, and Schieble in Michigan in 1953.

They conclude that the incidence of infection among household and daily contacts is higher than formerly determined. It is also true that the ratio of non-apparent to apparent infection in the immediate family group is approximately 3:1 and not higher than 7:1 as compared to a ratio of 100:1 in the general population. This high incidence is probably due to the high degree of exposure present in close contacts.

Short-Term Group Therapy of Patients with Parkinson's Disease. M. E. Chafetz; N. Bernstein; W. Sharpe, and R. S. Schwab. *New England J. Med.* 253:961 (Dec. 1) 1955.

Although Parkinson's disease is not psychogenic in origin it is well known that emotional upsets intensify the symptoms. Group psychotherapy suggested a means of understanding the emotional reactions of patients with this condition and offered a possible practical method for improving their adjustment. Two groups of five patients each and one group of seven patients all with the postencephalitic type of Parkinson's disease attended psychotherapy sessions of one hour each, twice a week, for 6 weeks. The severity of symptoms in the patients in these groups ranged from minimal involvement to severe incapacitation. Age range was 32 to 67 years, duration of illness was 6 months to 30 years, and the intelligence of all patients was normal. Each group was led by a different physician. Group unity was established immediately by the similarity of difficulties of members of the group. Other factors that bound the group together were comparison of medication and dosage schedules and resentment against public opinion and their families' impatience regarding their condition. Interest was shown in famous people with the disease, clinical research, and medical progress. Some of the more obvious mechanisms of response to the disease were denial of its existence, anxiety, and depression. These last two responses were somewhat allayed by answering queries and clarifying misconceptions of the patient concerning the disease. Best results were achieved by the active participation of the group leader. The authors conclude that short-term group psychotherapy is a practical and effective means of helping patients adjust themselves to chronic illness.

Providing Prostheses After Amputation for Malignancy. William F. Hickey, and A. Arthur Rosse. *J. Rehab.* 21:9 (July-Aug.) 1955.

The question of prostheses for amputations resulting from malignancy has plagued counsellors in vocational rehabilitation and physicians. The economic and medical feasibility of artificial appliances in such cases has been open to question. The authors have attempted to shed some light on this problem by gathering together a total of 55 sufficiently complete cases which represent the experience of 17 state vocational rehabilitation agencies.

A tabulation of the data shows that 60 per cent of this group of amputees survived for two years or more. Some lived over eleven years. Only 7 per cent of the cases died within a year after amputation. When the data are combined they reveal that 92.7 per cent of the total number given prostheses survived at least two years or more. Moreover, in reviewing the available data no evidence was found that the provision of a prosthesis immediately upon surgical recovery had any adverse effect on the prognosis; nor was it possible to demonstrate any greater survival rate among those clients whose prostheses were not supplied until long after the amputation.

The 92.7 per cent of the cases previously mentioned were gainfully employed in a variety of jobs. At the end of two years this group would have paid \$18,564 in taxes. Estimating the cost of a prosthesis at \$300 the expenditure for 55 prostheses would have totaled only \$16,500. This certainly indicates that it is economically sound to purchase prostheses for such people. In addition, the psychological lift given to the morale of the individual by the fitting of a prosthesis cannot possibly be valued in terms of dollars and cents.

SUCCESS IS THE KEYNOTE

of our meeting this year! An interesting and scientific exhibit will contribute much to our success. In addition to the tremendous value of these exhibits, *you* have the opportunity to be considered for one of the coveted awards. Requests for applications for scientific exhibit space in connection with the 34th annual session scheduled for September 9-14, 1956, The Ambassador, Atlantic City, N. J., are now being received. Address all communications to the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, Illinois.



Book Reviews

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

EDUCATING PHYSICAL THERAPISTS TO MEET THE CHALLENGE OF THE FUTURE. By *F. A. Hellebrandt, M.D.* Paper. Pp. 129, with illustrations. Stipes Publishing Company, Champaign, Ill., 1953.

The author proposes establishing the physical therapy technician as consultant to the medical profession. The text is interesting and provocative, but is hardly a scientific study. It is cluttered with personal philosophies. Many of the criticisms are personal prejudices, not substantiated, and so cannot be evaluated.

Empiricism and the lack of scientific approach to education and medical care are sharply criticized but the author, while writing a provocative manual, does not offer a practical, workable solution to the medical and educational problems that are presented.

GOLD TREATMENT IN RHEUMATOID ARTHRITIS. With Some Notes on Hormone-Gold and Hormone-Salazopyrin Therapy. By *Folke Bohman.* Paper. Price, \$4.85. Pp. 164. S. Karger, Basel, Switzerland; Albert J. Phiebig, PO Box 352, White Plains, N. Y., 1954.

This is a supplement of a periodical produced quarterly and devoted to medical genetics and statistics. As such this supplement presents an article attempting to evaluate the efficacy of gold in the treatment of rheumatoid arthritis. There are pages and pages of statistics which are *pointed* to prove that gold should be the treatment of choice in patients with rheumatoid arthritis.

However, one is amazed by the total lack of scientific control. First of all, the follow-up work is done by questionnaire in an effort to learn the present status of patients treated at a national hospital. Second, the controls were those patients of the same period of time, treated by other than gold — usually physical therapy. Third, the criteria of consideration were (a) number of joints involved, (b) erythrocyte sedimentation rate, (c) duration of the disease and, (d) their work capacity after treatment.

On the basis of these considerations the statistics show gold therapy in a very favorable light and physical therapy in a very poor light. The latter part of the article is a

review of 42 cases treated with gold and hormone therapy and 20 cases treated with salazopyrine and hormones. Even these cases were only partially followed up by examination.

On the whole it looks like the research project of a graduate student. It proves nothing and leaves the impression that gold is the drug of choice in the treatment of rheumatoid arthritis. The treatment generally accepted in this country, of good medical management plus physical therapy and rehabilitation was not discussed or evaluated.

AN ELEMENTARY TEXTBOOK OF PSYCHOANALYSIS. By *Charles Brenner, M.D.* Cloth. Price, \$4.00. Pp. 219. International Universities Press, 227 W. 13 St., New York 11, 1955.

This book is a concise explanation of what psychoanalysis is about, especially its theories of normal human motivation and behavior. It also presents the essentials of its historical development. The author is not writing for the layman nor is he presenting the methodology of actual treatment of disease. It is therefore highly satisfactory for the medical student and the non-psychiatrist physician. The author is no idolator of Freud, taking pains to emphasize the contributions of recent psychoanalytical thinkers.

This is the most lucid writing by a psychiatrist the reviewer has ever encountered. Those funny words, "id", "superego", "cathexis" etc., are all here but the other tiresome jargon is not.

Highly recommended is this exposition of a significant movement in human affairs.

DOCTORS ARE PEOPLE. By *W. Berg Mann, M.D.* Cloth. Price, \$2.00. Pp. 83. Vantage Press, Inc., 120 W. 31st St., New York, 1954.

There is a saying that "fact is stranger than fiction." The trouble with "Doctors Are People" is that it is difficult to differentiate between the two. The book is supposed to be a disguised autobiography of a young doctor who, four years out of school and after the limited experience of a ship's doctor, finds

himself the only doctor of a small Canadian town of 2,000 population. Here over a period of three years he delivers 1,000 babies, or a ratio of one delivery to two people. Not only that, but in his first year, after one caesarian section performed from the book, he contributes an article to the Canadian Medical Journal on his new method of performing a caesarian section. The author criticizes surgeons for performing unnecessary operations, yet he claims to have operated on four hundred patients, and this without any operative experience whatsoever. All his technic was obtained from books!

The only believable part of the story is that the first chance the village had, it replaced him with another doctor. This book is not recommended.

ARTHROPLASTY. By *St. J. D. Buxton*, F.R.C.S. Cloth. Price, \$6.00. Pp. 126, with illustrations. J. B. Lippincott Company, E. Washington Sq., Philadelphia 5, 1955.

From his own extensive experience, the author gives a concise outline of the historical development of arthroplasty; its general principles, objectives and limitations. Of particular interest are the indications, which in this operation make a jointplasty justifiable, if not necessary.

Although the monograph deals with arthroplasty in general, the hip joint is dealt with in greater detail. The merits of Smith-Petersen's cup and Judet's prosthetic replacement of the femoral head are carefully weighed.

The author has rightly avoided details of surgical technic as anyone doing arthroplasties must be resourceful enough to adjust the technic to the local needs which differ considerably with the individual patient. Instead, emphasis is being laid on proper selection of cases which together with adequate after-treatment determine in large measure the eventual outcome.

HEADACHE AND LIFE STRESS: A Psychosomatic Study of Headache. By *A. Stenback*. Paper. Pp. 143. Ejnar Munksgaard, Norregade 6, Copenhagen K, Denmark, 1954.

This monograph contributes to the rash of recent articles and books on the relationship of the psychosomatic concepts and methods in medicine from its role in allergy to zinnus. The author stresses the point that "psychosomatic medicine is holistic medicine" and that "all reactions of the whole organism to all stimuli" must be considered in psychosomatic investigations. Such studies include the personality, the life stress, and the physiological and psychological changes due to life stress. The book thus logically develops along these lines with a framework of seven parts. Part I includes the introduction, covers methodology

and patients studied, including history-taking, the physical examination, and special tests. Part II defines the author's criteria for definition and differentiation of headache; his use of "experimental histamine headache" as a diagnostic test is outlined, although the interpretations will be subject to considerable question. The role of "constitution" and "personality" is discussed at length in Part III. Biological inferiority of organs and the relationship of heredity to headache is postulated. Life stress is considered and defined in Part IV. The term covers "all things in the life of the patient which the patient—experiences as 'stress' or which by sociological investigation are established as circumstances producing disturbances in human life." Life stress thus is "the objective, external stimulus which produces that subjective, internal experience of stress —." Physiological mechanisms and vegetative changes are considered in Parts V and VI and psychological changes are the subject of the final section, Part VII.

A summary concisely restates the author's hypotheses and his methods of investigations of headaches not produced by "organic" disease. The monograph is well written in typical continental style and sentence structure. It is of little general interest outside of the groups for which it is written and should be a special challenge to the psychotherapist and neuro-psychiatric personnel.

MIGRAINE AND PERIODIC HEADACHE. A Modern Approach to Successful Treatment. By *Nevil Leyton*, M.R.C.S. Second edition. Paper. Price, \$2.50. Pp. 128. Charles C Thomas, 301-327 E. Lawrence Ave., Springfield, Ill., 1954.

This little book gives an interesting review of periodic headache, its causes, diagnosis and treatment. The author postulates a basic cause for the headache — namely, an increase of estrogenic substance, and an exciting factor induced by a psychogenic mechanism such as worry, fatigue, or other mental upset. This exciting mechanism is associated with the release of histamine or a histamine-like substance. Headache is produced when these two factors coincide in the same individual. The treatment is based upon the exhibition of anterior pituitary type hormones and histamine desensitizations. Nineteen case histories illustrate the method of attack upon this problem. While the book may not pass the true scientific test of etiology of "Migraine" headache, it is of interest to the general practitioner as well as the internist.

TALKING WITH PATIENTS. By *Brian Bird*, M.D. Cloth. Price, \$3.00. Pp. 154. J. B. Lippincott Company, E. Washington Sq., Philadelphia 5, 1955.

This volume contains considerable informa-

tion which should be valuable for all physicians. It is particularly timely as more and more interest develops in chronic illness and with it an attempt to understand the patient's problems as well as to treat his medical or surgical illness.

The author points out that to study the patient in order to diagnose a disease, and not to study the person, "may prove to be little more than highly skilled first aid."

The first half of the book discusses the technic of talking with adults that the doctor may search beyond the obvious for "signs and causes of illness and distress which patients so commonly do not themselves recognize." Various types of problems are discussed.

Part two takes up the problem of communicating with children and is presented for the doctor who sees children occasionally. Here the fears of both the parents and the child at different ages are discussed, along with suggested means of coping with them.

The chapter on "The Patient Who Asks for Advice" is especially good, but the whole book shows a keen understanding of people, both adult and children, and their many fears and problems in coping with life. Some very helpful ideas in getting a better relationship between physicians and patients are given. This volume is recommended not only for doctors and medical students, but also to other ancillary personnel who work with patients.

BIOCHEMICAL PREPARATIONS. Vol. 4. Edited by W. W. Westerfeld. Cloth. Price, \$3.75. Pp. 108. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, 1955.

This edition of "Biochemical Preparations" gives a detailed preparation of twenty compounds of biochemical interest. This, accompanied by the first three volumes of this series and the numerous volumes of Organic Syntheses, gives readily available technics that are not only useful for the preparation of the compounds listed, but are also often applicable to the preparation of related compounds.

Although the number of biochemical substances available commercially is rapidly increasing, it is quite necessary that every research laboratory have handy reference volumes such as "Biochemical Preparations." The authors of volume 4 have followed the same clear, precise, descriptions as were used in the first three of this series.

The descriptions of each preparation are divided into four parts. The first gives the overall outline of the isolation or synthesis; Part II lists the starting materials; Part III gives the detailed procedure while Part IV discusses the purity and properties of the product.

This volume is designed to accompany the others that have been published and many to follow and is useful mainly as a member of

the series. It would find little use outside a research laboratory.

CARDIAC EMERGENCIES AND HEART FAILURE. Prevention and Treatment. Second edition. By Arthur M. Master, M.D.; Marvin Moser, M.D., and Harry L. Jaffe, M.D. Cloth. Price, \$3.75. Pp. 203, with graphs. Lea & Febiger, Washington Sq., Philadelphia 6, 1955.

This book was written to serve as a *vade mecum* of pocket size "so that the physician may have it available for use at all times." By restricting themselves largely to emergencies, the authors have been able to compress a surprising amount of basic information and detail into a small space. The matter is organized under nine main headings: Arrhythmias, acute pulmonary edema, angina pectoris and coronary occlusion, syncope, rheumatic fever, hypertensive encephalopathy, dissecting aneurysms, traumatic heart disease, surgery in the cardiac patient and cardiac arrest.

Pathological physiology is briefly discussed where essential, and the criteria for accurate diagnosis are presented. Illustrative case histories are included. There is a bibliography of 346 titles. Tables are used to summarize the distinction between easily confused conditions, such as angina pectoris, coronary insufficiency, coronary occlusion and pericarditis.

The material is up to date and well put together. This volume can be highly recommended as a reliable and up-to-date guide to a changing and difficult field.

PAIN: ITS MECHANISMS AND NEUROSURGICAL CONTROL. By James C. White, M.D., and William H. Sweet, M.D. Cloth. Price, \$17.50. Pp. 736, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1955.

The authors record clinical experiences, many under local anesthesia, in a large general hospital over the last 15 years. The work is divided into a section on basic anatomy and physiology of pain, a section on neurosurgical technic and a section on treatment of specific syndromes. The premise of treatment is almost wholly palliation of pain and not eradication of its cause. Although describing many other valuable procedures, especially those about the head and neck, the authors clearly rely to a major extent on anterolateral tractotomy of the spinal cord, uni- or bilateral; and high enough and deep enough to accomplish their purpose.

The section on fundamental aspects is very thorough and not slavishly devoted to tradition. For example, the authors challenge the conventional statement that bare nerve endings transmit only pain. The section on technics is brief but clear. The illustrations are particularly good. The section on results compares

the many procedures that have had temporary or continuing popularity.

Every neurosurgeon will want to own this fine book. Some will disagree that spinal cordotomy is as good as the authors say it is.

THE TECHNIQUE OF PSYCHO-ANALYSIS. By *Edward Glover, M.D.* Cloth. Price, \$7.50. Pp. 404. International Universities Press, Inc., 227 W. 13th St., New York 11, 1955.

This book is directed to students, teachers and practitioners of psycho-analysis. The first half of the book deals with technics of analysis, resistance of patients, and transferences. Frequent reference is made to the role the analyst's personality plays in the analysis. Much detail is given to the fine points of technic, and the author expects the reader to have a general knowledge of the subject. In four chapters, psychological problems are divided into accessible cases, moderately accessible cases, and intractable cases. The problems encountered in the various types of cases are discussed.

The author made a survey of active members of the British Psychoanalytical Society to determine technics of analysis being currently used. The questions, answers and interpretations are given.

Included in the book are three papers by the author on results and criteria of psycho-analysis.

The book will give the general physician an insight into psychoanalysis, but he will encounter a number of unfamiliar terms and expressions, and may find the discussion too detailed for his interest.

BIOLOGICAL SPECIFICITY AND GROWTH. Edited by *Elmer G. Butler.* Cloth. Price, \$5.00. Pp. 233, with illustrations. Princeton University Press, Princeton, N. J., 1955.

This monograph consisting of 11 papers on biological specificity and growth was published under the sponsorship of the Society for the Study of Development and Growth.

The papers were presented at the twelfth symposium in 1953. Each paper is well prepared and technically informative. The subjects range from specificity in growth control to immunogenetics. Each paper is published in its entirety, with bibliography. It gives the biologist the opportunity to cover the highly specialized material presented at this symposium in one volume. The monograph is well organized and several papers have photomicrographs.

ELECTROCARDIOGRAFIA. By *Dr. Emilio Araya.* Paper. Pp. 425, with 222

illustrations. Lopez & Etchegoyen, S.R.L., Junin #63, Buenos Aires, 1955.

This book offers a systematic introduction to the subject of electrocardiography, beginning with some fundamental facts about the electrophysiology of cells and going on to a detailed consideration of the events of the cardiac cycle. The nomenclature of leads and waves is discussed, and eight well-illustrated chapters explain the electrocardiographic manifestations of cardiac disease.

Especially commendable for clarity is the exposition of recent attempts to represent the electrical events in the heart by means of vectors in 3-dimensional space. The author refrains from either praising or condemning this elaborate, confusing technic. The book is provided with an accurate bibliography and a good index; it is to be recommended.

RESEARCH AND EDUCATION IN RHEUMATIC DISEASES. Transactions of First National Conference at National Institute of Health, November, 1953. Edited by *Joseph J. Bunim, M.D.* Paper. Pp. 141, with illustrations. Sponsored by American Rheumatism Association, Arthritis and Rheumatism Foundation, and National Institute of Arthritis and Metabolic Diseases. The Arthritis and Rheumatism Foundation, 23 W. 45th St., New York 36, 1954.

This is a composite work and the quality of the contributors is not consistently even, due to the fact that it consists of the contributions of many essayists. Deserving of special mention are the contributions by Jerome Gross, on structural and chemical studies on connective tissue; DeWitt Stetten, on intermediary metabolism, and Charley J. Smyth, on deficiencies in teaching rheumatic diseases in the medical schools of the United States. The book is completed by a lively discussion among T. Duckett Jones, Walter Bauer, John R. Paul, DeWitt Stetten, and W. Paul Holbrook.

The readability of the articles varies but there is a great deal of practical advice, particularly to the general practitioner, the rheumatologist, and the medical student.

AN INTRODUCTION TO PATHOLOGY. By *G. Payling Wright, D.M., F.R.C.P.* Second edition. Cloth. Price, \$7.50. Pp. 636, with illustrations. Longmans, Green & Company, Inc., 55 Fifth Ave., New York 3, 1954.

The author of this book leads the reader through the fields of physiology and biochemistry to the essentials of pathology. He uses these basic sciences to explain the pathogenesis of various disorders and ensuing tissue alterations. The main value of this publication is the introduction of research problems and the discussion of recent diagnostic methods.

There are good chapters on nutritional diseases, hypersensitivity reactions, cell reactions to ionizing radiations, etc. Footnote references are abundantly appended. Illustrations are not too numerous but well chosen. This readable and most informative volume is recommended for everybody who is interested in widening his knowledge of pathology.

THE EFFECT OF ACTH AND CORTISONE UPON INFECTION AND RESISTANCE. Edited by *Gregory Schwartzman*, M.D. Cloth. Price, \$5.50. Pp. 204, with illustrations. Columbia University Press, 2960 Broadway, New York 27, 1953.

This monograph presents 13 papers on the various aspects of the role of ACTH and cortisone on infections and tissue resistance. The material was presented at a symposium of the Section of Microbiology of the New York Academy of Medicine in 1952. Subjects range from a general consideration of the hormones in intermediary metabolism to studies of experimental infections. Consideration also is given to the effect of this hormone on allergic responses of the tissues. One paper on experimental poliomyelitis is of particular interest to physiatrists in that it presents evidence that the hormones have an adverse effect on the course of this disease in experimental animals. The same effect is seen with other experimental infections such as influenza, mumps and Cocksackie disease.

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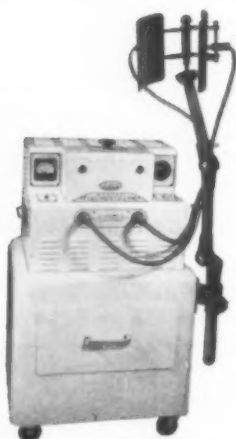
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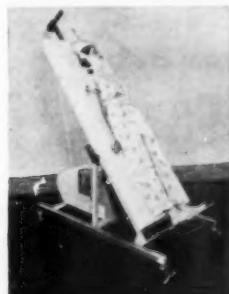
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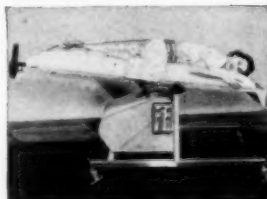
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BY

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